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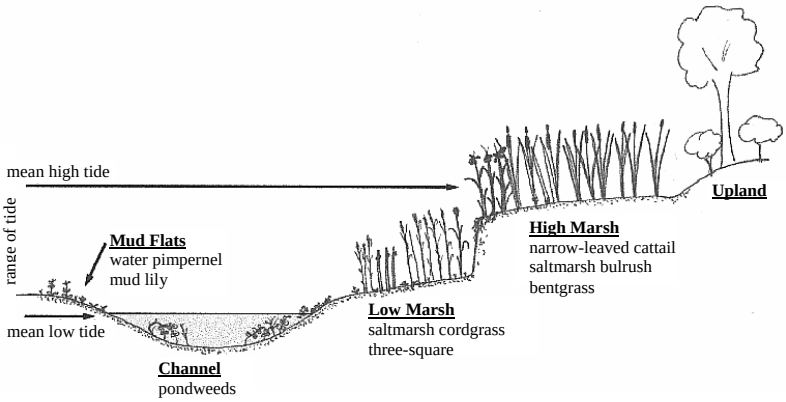
Brackish Tidal Marshes

State Status: None
Federal Status: None

Description: Brackish tidal marshes occur along free-flowing coastal rivers, and are influenced daily by the incoming tides. Although they are flooded by the tides, they receive enough freshwater input from the river to dilute the salt water. This community may also occur in smaller patches in upper zones of coastal salt marshes and salt ponds, usually near seepages or freshwater transition areas. Brackish tidal marshes are characterized by somewhat salt tolerant plant species, typically emergent grasses, sedges, rushes and forbs. They support several rare species. Brackish tidal marshes are considered to be a globally uncommon type of natural community and are tracked by the Natural Heritage and Endangered Species Program as a high priority natural community in Massachusetts.

Environment: Brackish tidal marshes occur along the dynamic shores of rivers, and hence are often structurally diverse. They may include high marsh, low marsh, mud flats, rocky shores, and the river channel. Ditches and freshwater seepages and streams may add to the complexity of the habitat. The phenomena of the saltwater "wedge," formed by the freshwater floating on the heavier saltwater, extends the salt influence further upstream in the lower-lying areas such as mud flats, ditches and shores (brackish and freshwater environments may therefore be adjacent to each other). Lower lying zones are also subject to more prolonged inundation. All of these habitat variations share two common features: Average annual salinity is 0.5-18 parts per thousand, and the habitat is flooded (usually twice) daily. Brackish tidal marsh represents the middle of a gradient, ranging from coastal salt marsh, to brackish tidal marsh, to freshwater tidal marsh. Smaller patches may occur along the upland edges of coastal salt marshes, near stream inputs, seepages or other freshwater transition areas.

- High marsh, also called backmarsh, is similar in structure to the high marsh of tidal salt marshes, with different species. Backmarsh begins with an abrupt bank of peat 1-3 feet above mean low water. Backmarsh is generally more developed along lower gradient rivers (North, South, Taunton and Palmer Rivers).
- Low marsh develops on the muddy or rocky sloping shores of tidal brackish areas, the result of respective deposition or scouring. Low marsh is usually limited to small stands located below the bank of the high marsh.
- Mud flats are usually more sparsely vegetated than the low marsh, supporting a different suite of low-growing plants, perhaps due to the increased disturbance from sediment deposition and more prolonged flooding.
- Rocky shore habitat, like the mud flats, is sparsely vegetated with low growing annuals, perhaps due to shallow soils and stronger erosive forces from the river. Rocky shore habitat is usually limited to small patches, however higher gradient or larger rivers appear to support more of this habitat type.



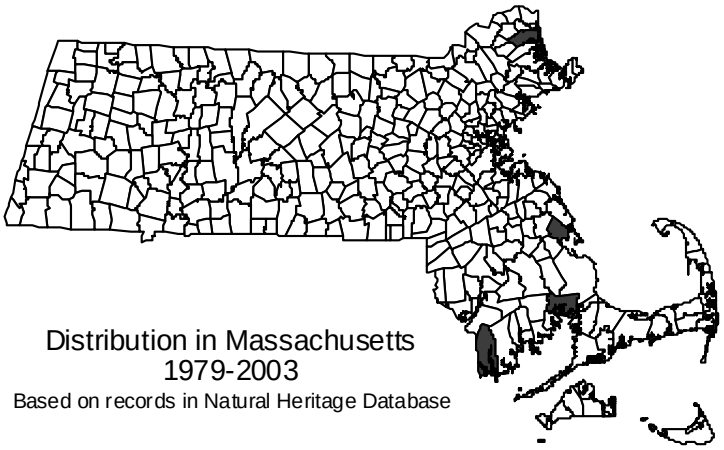
Cross-section showing plant distributions and characteristic plants of Brackish Tidal Marsh.

Characteristic Plant Species: Narrow-leaved cattail *(Typha angustifolia)* is typically dominant in the backmarsh (highmarsh), with frequent stands of common bulrush *(Phragmites australis)*. Freshwater cordgrass *(Spartina pectinata)* and saltmarsh bulrush *(Scirpus robustus)* occur along the banks, associated with bentgrass *(Agrostis stolonifera)*, which frequently sprawls over the edge. Low marsh supports stands of saltmarsh cordgrass *(Spartina alterniflora)* and three-square *(Scirpus pungens)*. Mudflats and rocky shores support sparse low herbs such as water-pimpernel *(Samolus valerandi ssp. parviflorus)*, mud lily *(Lilaeopsis chinensis)* and creeping spearwort *(Ranunculus flammula var. reptans)*. Aquatic plants usually include pondweeds *(Potamogeton perfoliatus, Zannichellia palustris)*. Plants of freshwater tidal marshes occasionally occur in the higher zones of brackish marshes.

Characteristic Animal Species: Brackish tidal marshes provide habitat for nesting Common Yellowthroat *(Geothlypis trichas)*, Yellow Warbler *(Dendroica petechia)*, Red-winged Blackbird *(Agelaius phoeniceus)*, Willow Flycatcher *(Empidonax traillii)* and Common Grackle *(Quiscalus quiscula)*. Brackish tidal marshes support some of the largest colonies in Massachusetts of the uncommon Marsh Wren *(Cistothorus palustris)*. The habitat is also used by resident Great Blue Heron *(Ardea herodias)*, Green Heron *(Butorides virescens)* and Osprey *(Pandion haliaetus)* nesting nearby. Brackish tidal marshes produce many important food plants, and the community often supports large concentrations of migrating and wintering waterfowl, particularly American Black Duck *(Anas rubripes)*. The channel may provide spawning habitat for anadromous fish such as Rainbow Smelt *(Osmerus mordax)*. Sea-run Eastern Brook Trout *(Salvinelis fontinalis)* is often present in small spring-fed streams within brackish tidal areas.

Table 1. Salinity tolerances of common plants in the salt-brackish-freshwater gradient. (Adapted from Odum *et al.* 1984)

	SALINITY REGIMES					
	Salt	<-----Brackish ------->			Fresh -------->	
SPECIES	18+ ppt	10-17ppt	6-10ppt	3-7ppt	0.5ppt	0.2ppt
Saltmarsh Hay *(Spartina patens)*	X	X	X			
Saltmarsh Cordgrass *(S. alterniflora)*	X	X	X	X		
Saltmarsh Bulrush *(Scirpus robustus)*		X	X			
Salt Reedgrass *(Spartina cynosuroides)*		X	X	X		
Narrow-leaved Cattail *(Typha angustifolia)*			X	X		
Buttonbush *(Cephalanthus occidentalis)*			X	X	X	
Water Hemp *(Amaranthus cannabinus)*			X	X	X	X
Swamp Rose Mallow *(Hibiscus moscheutos)*			X	X	X	X
Arrow Arum *(Peltandra virginica)*			X	X	X	X
Common Reed *(Phragmites australis)*			X	X	X	X
Soft-stemmed Bulrush *(Scirpus tabernaemontani)*				X	X	
Jewelweed *(Impatiens capensis)*				X	X	X
Climbing Hempweed (*Mikania scandens*)				X	X	X
Wild Rice (*Zizania aquatica*)					X	X
Sweet Flag (*Acorus calamus*)						X



Associated Rare Species: The brackish tidal marsh community includes many state listed rare plant species, some of which are also found in similar habitat within freshwater tidal marshes. Long's bittercress *(Cardamine longii)* (E), Eaton's beggar-ticks *(Bidens eatonii)* (T), pygmyweed *(Crassula aquatica)* (T), estuary arrowhead *(Sagittaria calycina* var. *spongiosa)* (E) usually occur on sparsely vegetated intertidal mudflats. River arrowhead *(Sagittaria subulata* var. *subulata)* (E) may grow on mudflats, but also has a more delicate floating form which occurs in the tidal channel. Salt reedgrass *(Spartina cynosuroides)* (SC) occurs in small stands at the edge of the high marsh. Several of these species are also considered globally rare.

Associated rare animals include the New England Siltsnail *(Cicinnatia winkleyi)* (SC) and the Coastal Marsh Snail *(Littoridinops tenuipes)* (SC), both of which are associated with drainage ditches and seepages in fresh and brackish tidal marshes. Northern Diamondback Terrapin *(Malaclemys terrapin)* (T) may occur in brackish marshes, nesting in nearby open fields and sandy uplands. Atlantic Sturgeon *(Acipenser oxyrhynchus)* (E) and Shortnose Sturgeon *(Acipenser brevirostrum)* (E/FE) are known to spawn within brackish reaches of the Merrimack River. The large stands of cattail are suitable habitat for nesting Least Bittern *(Ixobrychus exilis)* (E) and American Bittern *(Botaurus lentiginosus)* (E). ***SC = Special Concern; T = Threatened; E = Endangered***

Range: Brackish tidal marshes are uncommon natural communities in Massachusetts: they are geographically limited to short stretches of tidal rivers in coastal areas. Many rivers in Massachusetts have lost much of their brackish tidal reach from dams located below the limit of tidal influence. Large and high quality example of this community type occur on the Merrimack, Parker, and Ipswich Rivers north of Boston and the Taunton, North and South Rivers south of Boston. Good medium-sized examples of this community type occur on the Palmer, Westport, Paskamansett, Weweantic, Agawam and Mashpee Rivers, and along several other rivers on the north shore. Occurrences along the upland border of salt marshes are not well documented, although they are reported from Salisbury, Berkley, Fairhaven and Duxbury. They are probably more widespread.

Management Considerations: Much of the damage to brackish tidal marshes has already occurred from historic land uses, such as damming, filling and channelization. With the more recent trend of breached or intentionally deconstructed dams, the potential exists for natural restoration of additional habitat. Invasive species appear to be the primary threat to this natural community. Although brackish tidal marshes are the natural habitat for the native genotype of Common Reed *(Phragmites australis*), several rivers, particularly in disturbed areas, are dominated by invasive Common Reed, and Purple Loosestrife *(Lythrum salicaria)* appears to be more aggressive in brackish marshes than in freshwater tidal marshes. Hydrologic alteration is an additional threat to this community. Excessive water withdrawal, either due to large municipal wells upstream or the cumulative impact of smaller withdrawals, can alter the location of the salt front, which depends in part on the amount of water flowing downstream. Local changes in salinity have profound impacts on the natural development of this type of community.

Additional Reading:

Odum, W.E., T.J. Smith III, J.K. Hoover, & C.C. McIvor. 1984. The Ecology of Tidal Freshwater Marshes of the United States East Coast: A Community Profile. USFWS. FWS/OBS – 83/17. 177 pp.

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